Denver Water's 2002

Treated Water Quality

Summary Report

The Hayman burn area around Cheesman Reservoir

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Introduction

Denver Water provides its customers with high qualitydrinking water. We want you to beaware of how that quality is maintained and to feel comfortable with and beknowledgeable of the water treatment process and the care and effort that gointo providing the Denver Metropolitan Area with water that meets the moststringent standards.

Weprepared this report to provide you with important information about Denver'swater quality. We want you to see whywe have confidence in the quality of Denver's drinking water.

Explanation of Terms

To better understand this report, refer to the tablebelow, it gives explanations of terms and measurement units that are used inthe report:

Measurement Units Interpretation Table

Unit	Full Name	Equivalent to:
	General Terms	
SU	Standard Units (a measurement of pH)	
µS	Micro Siemens (a measurement of specific conductance)	Micro mhos
°C	Degrees Celsius (a measurement of temperature)	25°C ≈ (= approx.) 77°F (Fahrenheit)
	Chemical Terms	
mg/L	Milligrams per Liter	Parts per million (ppm)
µg/L	Micrograms per Liter	Parts per billion (ppb)
NTU	Nephalometric Turbidity Units (a measurement of turbidity)	
pCi/L	PicoCuries per Liter (a measurement of radioactivity)	50 pCi/L ≈ 4 mRem/yr
mRem/yr	Millirem per year (a measurement of radioactive dosage)	
AU	Absorbance units (a measurement of the absorbance at a specific wavelength)	
	Microbiological Terms	
CFU/100 ml	Colony forming units per 100 milliliters (a bacterial unit)	
Count/ml	Count of organisms per milliliter of sample (a bacterial unit)	

Report Data

This report includes graphs and tablessummarizing data for samples collected throughout the year 2002 from thepotable treated water leaving Denver Water's treatment plants (planteffluents). This report also includes some data from the plant influents (rawwater). Results are expressed primarily as averages unless otherwisespecified. The data tables that begin on page 18 give the MCL, MaximumContaminant Level (the highest allowable level for a substance in drinkingwater), the average (avg.) value, the range of values from the lowest to thehighest for the year, and the number of samples tested (no.).

Parameterssuch as temperature, and turbidity, are measurements of physicalcharacteristics and are expressed in units specific to their analyses. Chemical results are generally expressed interms of concentration, weight or amount per unit volume, e.g. mg/L orµg/L. Microbiological results aregenerally expressed in terms of a count of organisms per volume of sample,e.g. CFU/100 ml. For total coliform,the percent of positive samples each month is calculated and reported. The EPA regulation states that no more than5% of the samples may be positive per month.

Treatment Plant Effluent and Distribution System

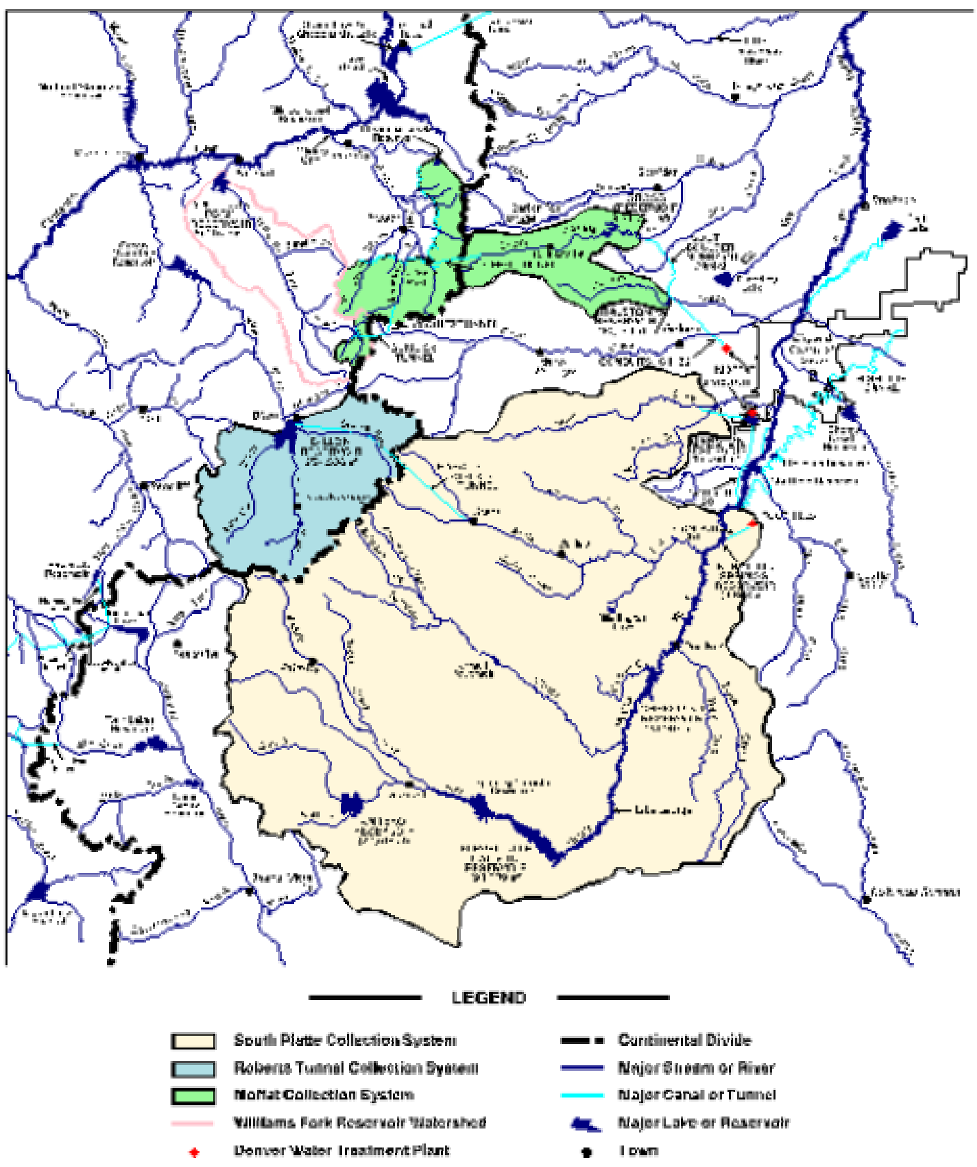
Total Coliform Samples for 2002

Month	Number of Samples	Number of Positives	% Positive
January	478	1	0.21%
February	469	0	0.00%
March	491	1	0.20%
April	578	1	0.17%
May	543	0	0.00%
June	522	1	0.19%
July	593	1	0.17%
August	561	0	0.00%
September	539	0	0.00%
October	586	0	0.00%
November	478	1	0.21%
December	540	1	0.18%
Totals	6,378	7	0.11%

Where Does Denver Get Its Water?

The South Platte collection system combines water from high mountain regions on the east slope of the Rocky Mountains with water diverted from Summit County and the Dillon collection system on the west slope of the Continental Divide. The Moffat collection system spans both sides of the Continental Divide, with the majority of it being located in Grand County on the west slope. Raw water from the Moffat collection system is sent through the Moffat Tunnel to facilities northwest of Denver for storage and treatment. Both sources provide high quality water, but their chemical characteristics are quite different and the source water mineral concentration varies seasonally with the amount of flow. In general, the water in the South Platte system is moderately hard and the water in the Moffat system is soft.

Water Collection System

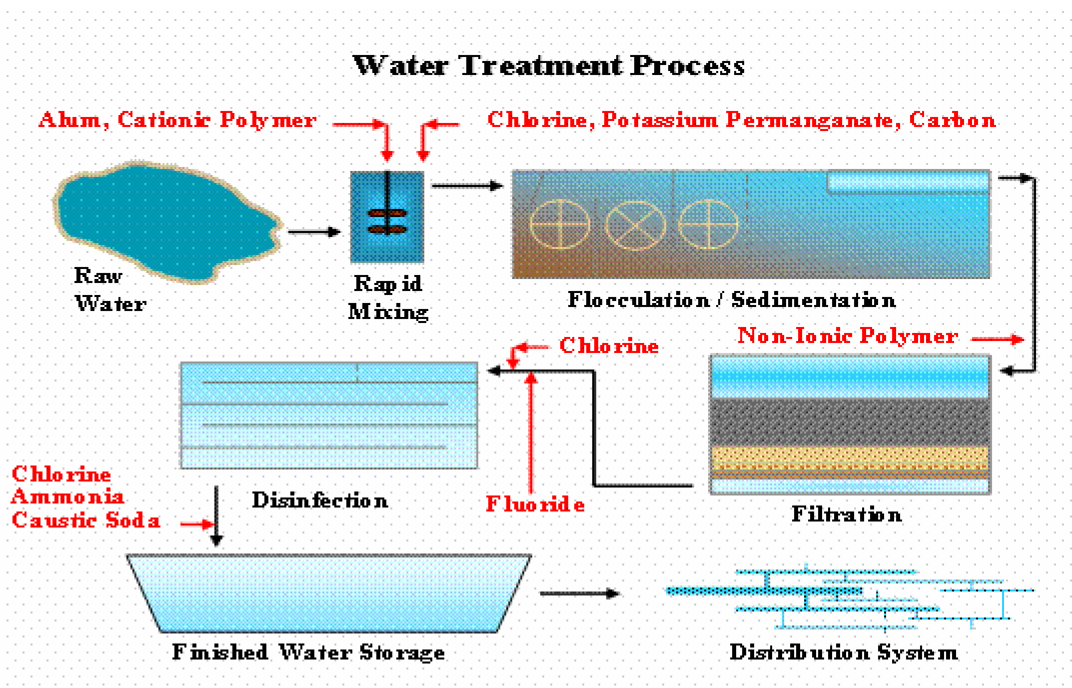


How Does Denver Make Drinking Water?

Denver Water has three treatment plants that process water collected from the areas shown above. Denver Water's three treatment plants have a combined maximum treatment capacity of 645 million gallons per day. Two treatment plants, Foothills and Marston, process water from the South Platte collection system. The third plant, Moffat treats water from the Moffat collection system.

The treatment process begins with the addition of "coagulants" to the raw water. These coagulants are commonly referred to as Alum and Polymer. Alum is aluminum sulfate a chemical that attaches to 'dirt' and other particles in the water. Through a process of slow mixing, the particles collide and stick together to make them larger. The larger particles are called "floc". Polymer strengthens the floc making it easy to filter in later processes. These now larger particles settle to the bottom of the sedimentation basin and the clarified water at the top of the basin is then sent to coal and silica sand dual media filters for filtration. Filtration further cleanses the water and removes microscopic debris. Each treatment plant aims for extreme clarity of the water, evidenced by low turbidities (a measure of clarity). Less than 0.20 turbidity units is a measure of clear, clean water. Potassium Permanganate or Carbon may also be added to control excess manganese or odors, respectively.

After filtration, the water is sometimes supplemented with a small amount of sodium silica fluoride to bring the total concentration of fluoride up to 0.90 mg/L. Caustic soda controls the pH, acidity/alkalinity of the water. It is added to adjust the pH of the water to between 7.5 S.U and 8.0 S.U. Finally, the water is thoroughly disinfected with a solution consisting of chlorine and a small amount of ammonia to form the final disinfectant called "chloramine."



Why Is The Water Treated This Way?

The treatment train outlined above is designed to remove dirt, particulate matter, naturally occurring organic matter (NOM), and microscopic organisms like bacteria that may be in the raw water. Effective filtration is crucial in the removal of microorganisms, including bacteria that are associated with solids such as dirt and debris. Disinfection kills potentially harmful microorganisms. Disinfection of drinking water has saved millions of lives over the century by preventing waterborne diseases such as typhoid and cholera.

Denver Water has used chlorine as a primary disinfectant since 1906. We use it early in the treatment process to allow sufficient contact time with the water for maximum disinfection. We have used chloramine since 1918. It is our secondary disinfectant. Chloramine is a very effective long lasting disinfectant that produces fewer disinfection by-products (DBPs), such as Trihalomethanes (THMs) and Haloacetic Acids (HAAs).

The Environmental Protection Agency (USEPA) establishes the regulations for all water utilities. In Colorado, the state health department (Colorado Department of Public Health and Environment) is the agency that oversees and enforces these regulations for water utilities. These regulations are very strict and require that drinking water is made safe for consumption over a person's lifetime. At present there are over 85 contaminants and groups of contaminants that are regulated in drinking water. Some of these contaminants are clearly a threat, like lead, while others are merely suspected of being health risks, but still considered serious enough to regulate. EPA has set regulatory limits for these compounds. Regulatory limits are levels of safety that must not be exceeded in order to maintain safe drinking water. Some contaminants are regulated based on the possibility of their occurrence in water. Their regulatory limits or levels were determined based on the best available data from health studies. The majority of the EPA's drinking water regulations apply to treatment plant effluent water (the finished water after treatment). We're happy to report that Denver Water has never violated any regulations to date. The compounds and elements that were **not** detected in any of the three treatment plant effluents are listed on page 17.

How Well Is Denver Water Doing?

Denver Water has been very fortunate to have clean source water with which to start treatment. The table below illustrates the effectiveness of treatment for a few parameters of note.

As mentioned earlier turbidity is a measurement of the clarity of the water; thus a low turbidity indicates good water clarity. Most microorganisms including bacteria are attached to particulate matter, which accounts for much of the turbidity in water. Therefore, turbidity is an extremely important parameter and has been regulated by the EPA for many years. The old standard was 0.50 turbidity units. New research indicates that the old turbidity standard was too high and a new regulation is now in effect. This regulation requires that turbidities in the treatment plant effluent waters be less than 0.30 turbidity units. For the last few years Denver Water has maintained plant effluent turbidities less than 0.20 turbidity units. Most of the time, we have less than 0.10 turbidity units!

Water hardness is relative, but in general, water with hardness above 12 grains per gallon is considered "hard" water. Hardness in water is an aesthetic quality and does not relate to the safety of the water. It relates to the mineral content of the water. When the mineral content of the water is higher, the water is harder. You may have noticed that in areas that have "hard" water, the ability to form soapsuds is lessened. Many customers inquire about the hardness of their water. The South Platte source has moderately hard water that varies seasonally from about 5 to 7 grains per gallon (gpg) of hardness, it is interesting to note that in 2002 this source had a three values greater than 7 gpg. Two of them appear to be directly related to runoff from the Hayman fire. The Moffat source, on the other hand is very soft, with hardness in the range of about 2 to 4 gpg.

The total coliform test is a measure of all types of coliform bacteria in the water. Coliform bacteria are found in the intestines of all mammals, including humans, as well as in soils and on plants. We test for coliform bacteria, which include *E. coli,* to determine the safety of the water. We test for total coliform in our plant influent and effluent waters as well as throughout our entire distribution system. On the rare occasion when a sample has tested positive for total coliform, we must then test for *E. coli,* as well as resample and re-test not only the original site, but also up and downstream of it. If *E. coli* is detected in the treated water, public notification would be mandated, and we would isolate and correct the problem. In the table below note that the values for the raw water from Foothills and Marston are higher. Most likely this is due to the impact of runoff from the Hayman fire.

Values for 2002

Parameter	Treatment Plant	Raw Water Result	Finished Water Result
Turbidity	Marston	1.07	0.06
Turbidity	Foothills	3.78	0.04
Turbidity	Moffat	3.37	0.05
Total Coliform	Marston	286	None detected
Total Coliform	Foothills	529	None detected
Total Coliform	Moffat	11	None detected

Are There More Serious Contaminants in the Water?

Denver Water has tested forall of the EPA regulated compounds for years and in anticipation of upcomingregulations, has tested for newly identified ones as well. Contaminants that have been seen in newsheadlines include lead, arsenic, mercury,*Cryptosporidium,Giardia,*and*E. coli*(*EscherichiaColi*) amongothers. Denver Water has tested forthese for over 15 years and has not detected them in the treated water. *Giardia*and*Cryptosporidium*have occasionally beendetected in the raw water, but the effective treatment system in our plants,as outlined on page7,removes or inactivates these microorganisms.

Denver Water AverageValues for 2002

Parameter	Treatment Plant	Raw Water Result	Treated Water Result
Lead	Marston	None Detected	None Detected
Lead	Foothills	None Detected	None Detected
Lead	Moffat	None Detected	None Detected
Arsenic	Marston	None Detected	None Detected
Arsenic	Foothills	None Detected	None Detected
Arsenic	Moffat	None Detected	None Detected
Mercury	Marston	None Detected	None Detected
Mercury	Foothills	None Detected	None Detected
Mercury	Moffat	None Detected	None Detected
Giardia	Marston	0.4	None Detected
Giardia	Foothills	2	None Detected
Giardia	Moffat	None Detected	None Detected
Cryptosporidium	Marston	None Detected	None Detected
Cryptosporidium	Foothills	None Detected	None Detected
Cryptosporidium	Moffat	None Detected	None Detected
E. Coli	Marston	3	None Detected
E. Coli	Foothills	4	None Detected
E. Coli	Moffat	<1	None Detected

Minerals In Nature That Are Found In Water

Phosphorus Calcium Sodium

Magnesium Potassium Barium Aluminum

All natural waters contain 'minerals' from the earth. These mineral salts result from the naturalerosion of soils and/or the decay of aquatic plants. The amounts of theseminerals in water also determine the characteristics of the water, such asits hardness. Minerals in water givewater its flavor. Mineral-rich wateroften tastes chalky or strong. Of the minerals shown above only barium andaluminum are regulated. Barium has aMCL (maximum contaminant level) of 2 ppm, while aluminum has a SMCL(secondary MCL), which is a non-enforceable drinking water regulation of 0.05to 0.2 ppm.

Denver Water Average Values for 2002

Parameter	Treatment Plant	Raw Water Result	Treated Water Result	EPA Regulatory Limit
Aluminum	Marston	0.06	0.04	0.05—0.2 ppm
Aluminum	Foothills	0.15	0.04	0.05—0.2 ppm
Aluminum	Moffat	0.14	0.03	0.05—0.2 ppm
Barium	Marston	0.04	0.04	2 ppm
Barium	Foothills	0.05	0.05	2 ppm
Barium	Moffat	0.05	None Detected	2 ppm
Calcium	Marston	34.0	33.6	None
Calcium	Foothills	34.6	34.0	None
Calcium	Moffat	8.3	10.7	None

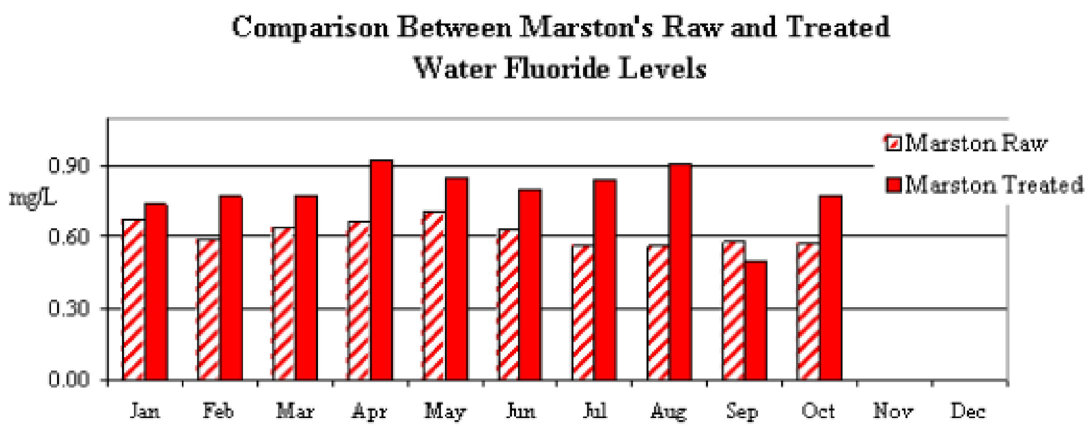
Parameter	Treatment Plant	Raw Water Result	Treated Water Result
Magnesium	Marston	8.3	8.2
Magnesium	Foothills	9.1	8.5
Magnesium	Moffat	2.0	1.9
Potassium	Marston	2.3	2.3
Potassium	Foothills	2.4	2.3
Potassium	Moffat	0.7	0.7
Sodium	Marston	16.9	19.6
Sodium	Foothills	18.4	23.0
Sodium	Moffat	2.6	6.9

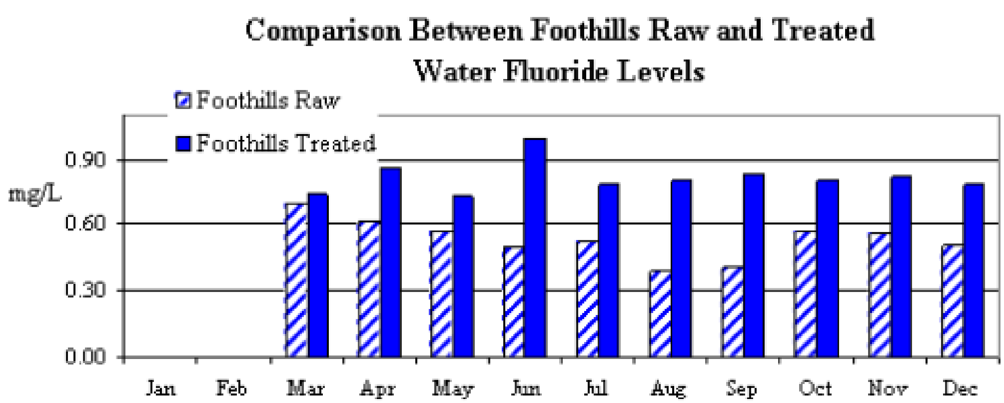
Most minerals are not removed by conventional treatment. Calcium, magnesium, iron and manganese amounts may be reduced by water treatment, but not completely removed. Please note that the comparisons above, though from the same treatment plants are not always from samples collected on the same dates for the raw and the finished waters, and therefore, are general comparisons. Drinking water naturally contains several minerals that are in fact beneficial to humans and mammals. The minerals in both of the tables above, are beneficial at prescribed levels. However, at levels above the regulatory limits (where applicable) some of these minerals may cause detrimental effects over a lifetime.

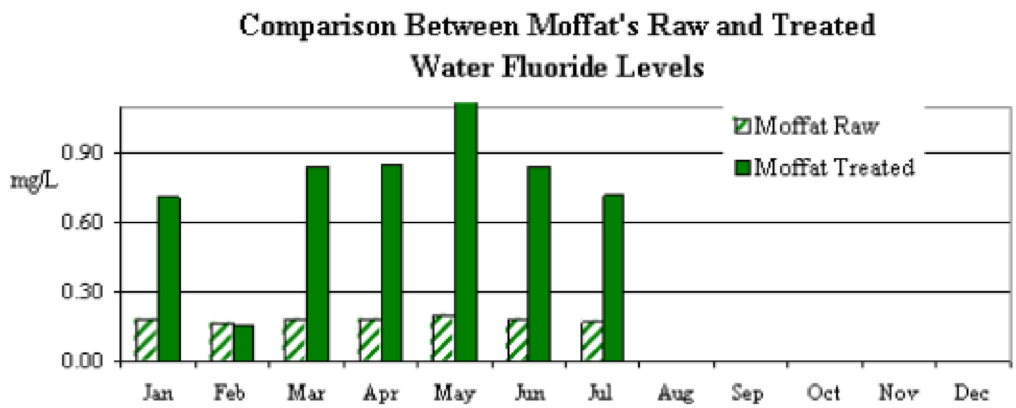
If there is no regulatory limit, or MCL listed in the above tables, then the amount of the mineral that might cause a potential health concern is much higher than would ever be found in water. It would be a waste of time and resources to regulate it.

Comparison of Fluoride Between Raw And Treated Water

Fluorideis a naturally occurring substance. The amount present in the South Plattesource water is ideal for helping to prevent tooth decay as determined by theColorado Department of Public Health and Environment. The Moffat sourcenaturally has lower amounts of fluoride and therefore must be fortified atthe treatment plant as directed by the state health department up to therecommended 0.90 mg/L. All of ourtreatment plants can supplement if needed.



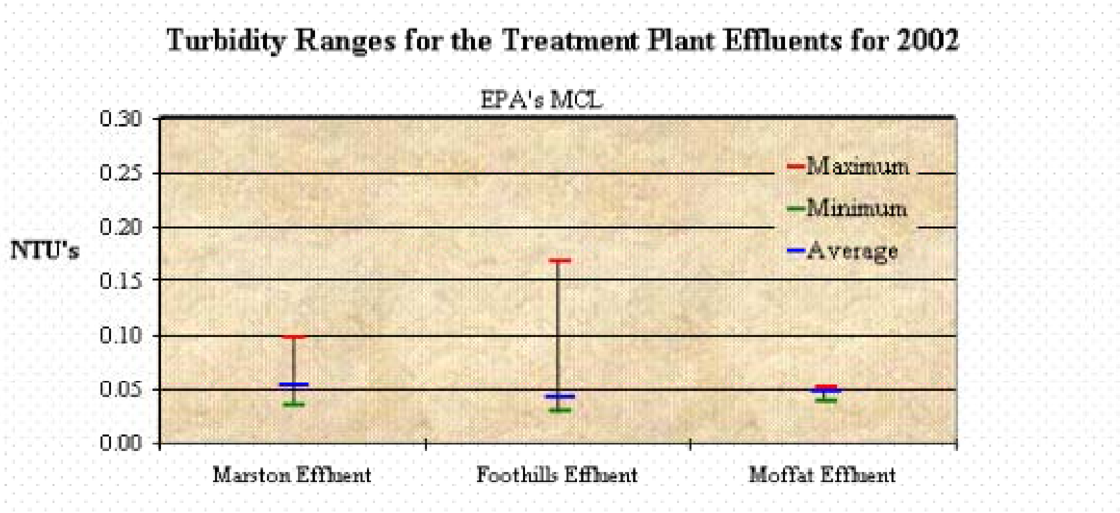




Comparison Between Moffat's Raw and Treated Water Fluoride Levels
mg/L
0.90
0.60
0.30
0.00
Moffat Raw
Moffat Treated
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Turbidity and Hardness Graphs

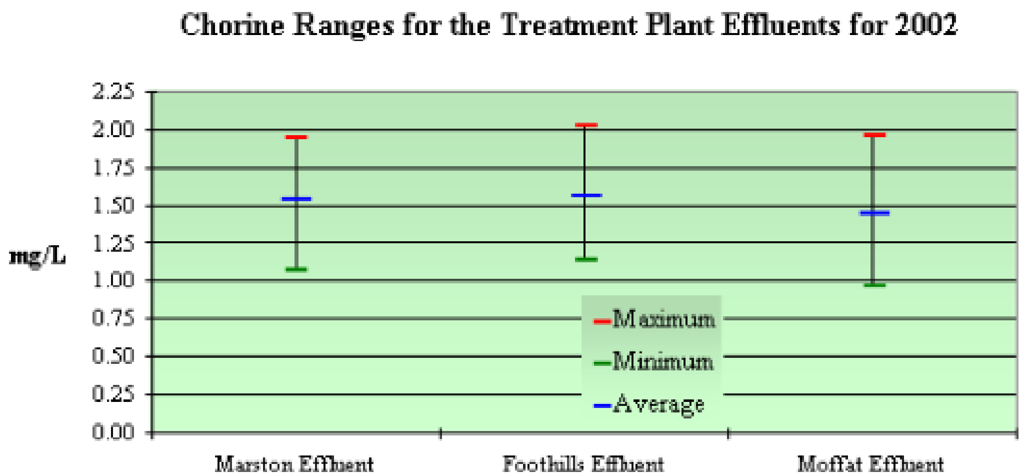
Turbidity refers to the clarity of the water. EPA has established a MCL for turbidity where at least 95% of the samples must be less than or equal to 0.30 Nephalometric Turbidity Units (NTU's) in the treatment plant effluents.



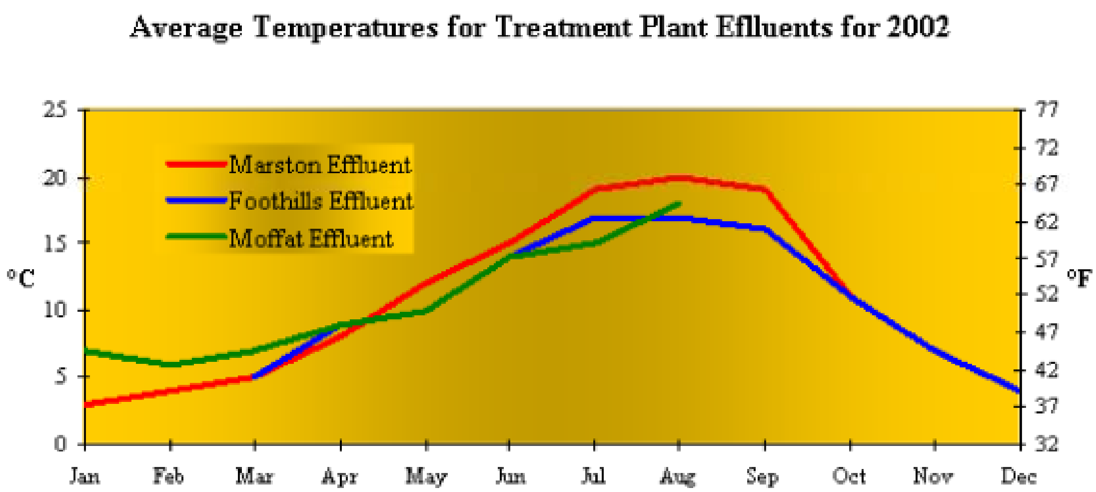
Water hardness is a result of calcium and magnesium salts dissolved in water. High concentrations of these minerals make water "hard". There is no universal hardness scale for water. Generally, water hardness as Calcium Carbonate of less than 12 grains per gallon (gpg) is not considered hard. The South Platte source water is moderately hard, and varies seasonally between 5 to 8 gpg of hardness, while the Moffat source is soft, and varies seasonally between 2 to 4 gpg. Most customers calling about hardness are inquiring for detergent usage amounts, or adding tap water to their irons or humidifiers.

Chlorine and Temperature Graphs

Denver Water uses chloramine to disinfect the water. The EPA regulation for chloramine is 4 mg/L. In the graph below chloramine is measured as total chlorine. During the late summer into the fall, the chloramine dosage was increased to minimize bacterial re-growth in the system. The goal for chloramine dosage is 1.3 ± 0.2 mg/L



The water temperatures leaving the treatment plants fluctuate seasonally. They are influenced by the temperatures of the flows from the mountain runoff, very cold in the winter and warmer in the summer. At higher temperatures, the disinfectant is more likely to dissipate. Chloramine residuals may be increased during the summer to ensure thorough disinfection. Breaks in the lines of the graphs indicate periods when the plant was not in service.



Terms And Explanations

The tables on the next pages show the results for the treatment plant effluent water tests. Either Denver Water's Water Quality Laboratory, or a contract laboratory performed these analyses during 2002.

Pages 18 through 23 are tables of data for compounds detected in our three treatment plant effluent waters. The tables contain the name of the compound, the range of detections for the year, the average result and the number of times for which it was tested. Most of the compounds detected are not regulated and do not pose a health or safety risk.

Compounds that were not detected in Denver's water are listed on the opposite page. We test for all of these compounds and contaminants at least annually. Contaminants that have been in the news recently, such as arsenic, lead, and radon are on the list. Some of the abbreviations next to the contaminant on the next page are explained below.

AL—Action Levels are EPA enforceable triggers for compliance that force public notification and treatment optimization.

MCL—Maximum Contaminant Level, the U.S. Environmental Protection Agency's (EPA's) drinking water regulatory limits. Based on health and toxicology studies, results at or below these levels in drinking water are considered safe. These are usually numeric values; sometimes they are designated as DS or TT (see below)

SMCL—Secondary Maximum Contaminant, the U.S. Environmental Protection Agency's non-enforceable, but recommended guideline level of a contaminant or compound. The exception to the rule is the fluoride SMCL of 2 mg/L that when exceeded triggers public notification.

DS—Distribution System is how the total coliform regulation is decreed. This means that the total coliform regulation (less than 5% total coliform positive samples per month) applies to the water in the distribution system (city) not just the treatment plant effluents.

TT—Treatment Technique, is used for the Lead and Copper Rule. The water treatment process used in the treatment plants must be optimized to control the levels of these parameters, such as corrosion control. The Lead and Copper Rule, specifically requires testing in a specified number of EPA defined "high risk" homes. EPA has defined "high risk" homes as older homes with lead plumbing or lead services and newer homes with copper pipe and lead based solder, built between 1982 and 1987. Lead solder was banned from domestic plumbing use in 1988. Homes built between the older ones and 1982 should have sufficient scale formation on the pipe walls to prevent contact with the plumbing thereby eliminating the possibility of lead from the plumbing leaching into the water. We not only test in these customer homes, but we also test the raw water, treated water and distribution system water for lead and copper. We have not detected lead in the raw, treated or distribution system water, and only small amounts of copper (less than a tenth of the regulatory limit) have been found.

Not Found In Denver's Drinking Water

Denver's water was analyzed for the following parameters. They were either not detected or the average result was less than the detection limits. The MCL is listed after the component in parenthesis where applicable. The unit of measure is also listed if different that that listed for the subsection. These potential contaminants are on EPA's nation-wide list of regulatory concerns.

Please contact Maria Rose at 303-628-5996 for the parameter list.

Data Tables For Treatment Plant Effluents

Marston Treatment Plant Effluent

Analysis	MCL	Avg.	Range	No.
General (mg/L)				
Alkalinity, Total as $CaCO_3$		66	55 - 86	1,822
Chlorine, Total		1.54	1.08 - 1.95	1,822
Hardness as $CaCO_3$		110	107 - 114	14
Monochloramine as Cl_2		1.33	0.81 - 1.77	1,822
pH (SU)		7.66	7.38 - 8.02	3,646
Specific Conductance (uS/cm)		331	250 - 400	211
Temperature (°C)		12	2 - 21	211
Total Dissolved Solids		195	184 - 211	10
Turbidity (NTU)	TT	0.06	0.04 - 0.10	3,646
Metals (mg/L)				
Aluminum, Total		0.044	0.028 - <0.09	10
Barium, Total	2	0.043	0.038 - 0.048	8
Calcium		33.6	32.0 - 35.7	9
Copper, Total	TT	0.006	<0.006 - <0.025	10
Magnesium		8.2	7.3 - 9.9	9
Manganese, Total		0.009	<0.006 - 0.017	10
Molybdenum, Total		0.031	0.014 - 0.036	8
Potassium		2.3	2.1 - 2.5	9
Sodium		19.6	17.4 - 26.3	10
Strontium		0.2	0.2	1
Zinc, Total		0.007	<0.005 - 0.007	10
Ions (mg/L)				
Chloride		24.0	22.1 - 33.3	10
Fluoride	4	0.87	0.51 - 1.33	1,822
Nitrate-Nitrogen	10	0.07	0.03 - 0.13	10
Silicon Dioxide		1.2	0.55 - 2.1	10
Sulfate		67.0	60.0 - 70.8	10

Data Tables For Treatment Plant Effluents

Marston Treatment Plant Effluent

Analysis	MCL	Avg.	Range	No.
Radiological				
Beta, Total (pCi/L)	50(4mRem/yr)	2.6	<2 - 3.5	4
Uranium, Available (mg/L)		0.0007	<0.0003 - 0.0015	9
Microbiological				
m-Heterotrophic Plate Count (CFU/ml)		3.7	0.02 - 20	43
Disinfection By-Products (µg/L)				
1,1,1-Trichloropropanone		1.4	1.4	1
1,1-Dichloropropanone		1.0	1.0	1
Bromochloroacetic acid		1.8	0.7 - 2.6	9
Bromochloroacetonitrile		0.8	0.8	1
Bromodichloroacetic acid		2.0	<1.0 - 3.0	6
Bromodichloromethane		5.1	3.2 - 8.5	14
Bromoform		0.7	<0.4 - 2.2	14
Chloral hydrate		0.9	0.8 - 1.1	3
Chloroform		6.7	3.3 - 14.2	14
Cyanogen Chloride		2.8	2.8	1
Dibromoacetic acid		0.6	<0.5 - 1.6	9
Dibromochloromethane		2.4	2.0 - 3.1	14
Dichloroacetic acid		3.4	1.6 - 4.8	9
Dichloroacetonitrile		2	2	1
Haloacetic Acids (5)	60	7	<5 - 9	9
Total Trihalomethanes	80	15	12 - 25	14
Trichloroacetic acid		3.1	1.9 - 4.9	9
Non-Specific Organic Compounds (mg/L)				
Total Organic Halogen		78.5	78.5	1

Data Tables For Treatment Plant Effluents

Foothills Treatment Plant Effluent

Analysis	MCL	Avg.	Range	No.
General (mg/L)				
Alkalinity, Total as CaCO3		70	53 - 86	3,450
Chloramine, Total		1.56	1.15 - 2.03	1,725
Hardness as CaCO3		118	107 - 137	13
Monochloramine as Cl2		1.42	1.01 - 1.92	1,725
pH (SU)		7.83	7.56 - 8.04	3,450
Specific Conductance (uS/cm)		342	250 - 480	192
Temperature (°C)		12	1 - 20	194
Total Dissolved Solids		209	188 - 242	9
Turbidity (NTU)	TT	0.04	0.03 - 0.17	3,450
Metals (mg/L)				
Aluminum, Total		0.036	0.024 - .048	9
Barium, Total	2	0.048	0.040 - 0.059	9
Calcium		34.0	30.8 - 37.1	9
Copper, Total	TT	<0.006	<0.006 - <0.025	9
Magnesium, Total		8.5	6.7 - 11.0	9
Manganese, Available		0.008	0.007 - 0.010	4
Molybdenum, Total		0.032	0.013 - 0.044	9
Potassium		2.3	2.0 - 2.7	9
Sodium		23.0	18.0 - 31.0	10
Strontium		0.2	0.2 - 0.2	1
Zinc, Total		0.007	<0.003 - 0.017	9
Ions (mg/L)				
Chloride		26.0	19.8 - 36.6	9
Fluoride	4	0.82	0.35 - 1.23	1,725
Nitrate-Nitrogen	10	0.12	0.06 - 0.20	9
Silicon Dioxide		1.6	1.0 - 2.5	9
Sulfate		68.9	60.0 - 75.5	9

Data Tables For Treatment Plant Effluents

Foothills Treatment Plant Effluent

Analysis	MCL	Avg.	Range	No.
Radiological				
Beta, Total (pCi/L)	50 (4mRem/yr)	3.0	<2 - 3.0	4
Uranium, Available (mg/L)		0.0016	<0.0003 - 0.0120	10
Microbiological				
m-Heterotrophic Plate Count (CFU/ml)		0.3	0.01 - 1.5	40
Disinfection By-Products (µg/L)				
1,1,1-Trichloropropanone		2.0	1.2 - 2.9	2
1,1-Dichloropropanone		0.9	0.5 - 1.3	2
Bromochloroacetic acid		2.4	1.3 - 4.0	8
Bromochloroacetonitrile		0.6	0.5 - 0.8	2
Bromodichloroacetic acid		3.5	1.0 - 6.0	3
Bromodichloromethane		9.1	5.0 - 13.0	13
Bromoform		0.4	<0.1 - 1.2	13
Chloral hydrate		2.5	0.7 - 3.7	5
Chlorodibromoacetic acid		<2.0	<2.0	1
Chloroform		19.2	5.6 - 33.1	13
Cyanogen Chloride		0.009	0.009	1
Dibromochloromethane		1.9	1.1 - 2.5	13
Dichloroacetic acid		8.1	5.2 - 10.8	8
Dichloroacetonitrile		4.8	2.3 - 7.3	2
Haloacetic Acids (5)	60	20	11 - 30	8
Total Trihalomethanes	80	30	12 - 48	13
Trichloroacetic acid		11.2	5.9 - 19	8
Non-Specific Organic Compounds (mg/L)				
Total Organic Halogen		230	230	1

Data Tables For Treatment Plant Effluents

Moffat Treatment Plant Effluent

Analysis	MCL	Avg.	Range	No.
General (mg/L)				
Alkalinity, Total as CaCO3		23	20 - 29	1,336
Chloramine, Total		1.45	0.98 - 1.96	668
Hardness as CaCO3		32	28 - 37	10
Monochloramine as Cl2		1.39	1.06 - 1.96	668
pH (SU)		7.80	7.40 - 8.42	1,336
Specific Conductance (uS/cm)		98	80 - 130	148
Temperature (°C)		10	3 -19	149
Total Dissolved Solids		65	58 - 75	7
Turbidity (NTU)	TT	0.05	0.04 - 0.05	1,336
Metals (mg/L)				
Aluminum, Total		0.03	<0.02 - 0.07	7
Barium, Total	2	<0.020	<0.025 - 0.020	5
Calcium		10.7	9.2 - 11.8	6
Copper, Total	TT	<0.01	<0.006 - <0.025	7
Magnesium, Total		1.9	1.6 - 2.2	6
Manganese, Total		<0.005	<0.005 - <0.006	7
Molybdenum, Total		<0.003	<0.003 - <0.005	5
Potassium		0.69	0.63 - 0.78	6
Sodium		6.9	5.4 - 7.8	7
Strontium		0.05	0.05	1
Zinc, Total		0.008	<0.003 - 0.032	7
Ions (mg/L)				
Chloride		3.3	2.7 - 3.8	7
Fluoride	4	0.83	0.13 - 1.45	668
Nitrate-Nitrogen	10	0.07	0.06 - 0.08	7
Silicon Dioxide		2.8	2.5 - 3.1	7
Sulfate		20.0	16.7 - 24.2	7

Data Tables For Treatment Plant Effluents

Moffat Treatment Plant Effluent

Analysis	MCL	Avg.	Range	No.
Radiological				
Beta, Total (pCi/L)	50$^{(4\text{mRem/yr})}$	<2	<2 - <2	3
Uranium, Available (mg/L)		<0.001	<0.0003 - <0.002	6
Microbiological				
m-Heterotrophic Plate Count (CFU/ml)		0.48	0.05 - 1.6	30
Disinfection By-Products (μg/L)				
1,1,1-Trichloropropanone		-	-	-
1,1-Dichloropropanone		-	-	-
Bromochloroacetic acid		<0.5	<0.5 - 0.6	6
Bromochloroacetonitrile		-	-	-
Bromodichloroacetic acid		<1	<1 - 1	6
Bromodichloromethane		1.9	1.1 - 2.6	9
Bromoform		0.7	<0.5 - 1.5	9
Chloral hydrate		-	-	-
Chlorodibromoacetic acid		<2.0	<2.0 - <2.0	4
Chloroform		7.8	5.2 - 7.8	9
Cyanogen Chloride		-	-	-
Dibromochloromethane		0.8	<0.5 - 1.6	9
Dichloroacetic acid		5.1	3.6 - 6.0	6
Dichloroacetonitrile		-	-	-
Haloacetic Acids (5)	60	10	9 - 12	6
Total Trihalomethanes	80	11	8- 15	9
Trichloroacetic acid		4.9	4.2 - 6.3	6
Non-Specific Organic Compounds (mg/L)				
Total Organic Halogen		90	90	1

Looking Down The Road

What does the future hold in terms of water treatment and drinking water? As with other utilities around the country, Denver Water is updating its treatment plants and exploring new treatments and techniques to optimize treatment in preparation for upcoming regulations and greater protection from contaminants in the future.

The Hayman fire devastated a vast area in the Rocky Mountains. Part of the area of devastation was around our Cheesman Reservoir, see the map on page 6. In 2002 and into 2003, we are working with other agencies to minimize the damage from the runoff of debris from the burned area into our reservoir as well as aiding in the re-seeding of the forest around the reservoir. We did see some increases in raw water turbidity and perhaps overall hardness of the South Platte source water during rain events last year in the burn area. For the first time in many years, we saw spikes in hardness values above 7 grains per gallon. One unexplained one in March, but 2 in August and September (post Hayman fire) after rains in the area. We also saw a slight increase in Total Organic Carbon after the rains in the area. We will continue to monitor water quality at Cheesman and the area around it, and remediate as much as possible, to prevent further damage to our watershed. A picture of some of the devastation at Cheesman is shown below.

At present the drought has not noticeably impacted our treated water quality. We will continue to remain vigilant for impacts and effects of the low water levels on our drinking water treatment and system. It is important to note that we have had below average snow falls in the mountains for going on six years now, and it will most likely take a minimum of three years of average mountain snow fall/runoff for our system to recuperate. Below is a picture of Antero Reservoir, see the map on page 6. Antero was drained late last year to fill Eleven Mile Reservoir.

Many new challenges await us in the drinking water industry. We are our own customers; therefore, we have a stake in making sure that the water is safe for all of us. We are also environmental scientists and we care about the preservation of our watershed and the natural beauty that surrounds it. Though we have caretakers who live near our mountain reservoirs and monitor them, customers help with this effort and we appreciate it. We are committed to meeting your water needs by continuing to provide high quality drinking water and excellent service. If you have a water quality concern or just have questions, or comments regarding water quality, give us a call at 303-893-2444.

Report prepared by:

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Water Quality Laboratory

Denver Water's 2002 Treated Water Quality Summary Report

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